

Appl. No. 10/709,212
Reply to Final Office Action mailed October 15, 2007

19.0405

REMARKS

Claims 1-71 are pending in this application, though claims 40-71 are withdrawn. Claims 1-8 and claims 10-18 are rejected under 35 U.S.C. 102(e), as being anticipated by U.S. Patent Publication No. 2004/0100263 ("Fanini"). Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fanini in view of Minerbo (US 6,304,086). Claims 19-39 are objected to as being dependent on rejected base claims, but otherwise allowable. Applicant respectfully traverses each of those rejections.

Applicants maintain its objection to the Examiner's conclusion that Fanini discloses an apparatus comprising antennas having tilted coils. Applicants incorporate herein, by reference, the entirety of its previous Reply to Office Action (filed September 5, 2007), including its Remarks and arguments directed to the Examiner's §102(e) and §103(a) rejections.

Fanini's invention is limited to transverse (and axial) antennas, that is, antennas having magnetic dipole moments oriented along an axis perpendicular (or parallel) to the tool axis (See '263, Abstract and ¶ 51 and 58.) Fanini does not teach the use of antennas with tilted magnet dipoles, as in the present invention. As previously submitted, Applicants' specification distinguishes between tilted and transverse antennas, with the present invention being directed to tilted antennas. The following excerpts were disclosed in the present application: "antennas having tilted or transverse coils"; and "instruments are thus implemented with a transverse or tilted magnetic dipole (TMD) antenna". (See 10/709,212 Application, ¶ 10) (emphasis added). If a "transverse" coil or dipole was understood to be a subset of "tilted" coils or dipoles, as the Examiner suggests, the author need only refer to "tilted" coils rather than "tilted" or "transverse." The author could also have referred to "tilted coils, including transverse tilted coils," or simply "tilted coils," as that term would have included coils tilted less than 90° and coils that are substantially perpendicular to the tool axis.

Applicants submit, further, that one skilled in the art of induction and propagating logging instruments will readily distinguish a tilted magnetic dipole antenna from a transverse magnetic dipole antenna. Applicants' specification makes a reference, in fact, to the knowledge of those skilled in the art of tilted antennas ("those skilled in the art will appreciate that various ways are available to tilt or skew an antenna"). (see page 1, para. 10). Further reference is made to patent specifications describing the instruments.

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U.S. Patent No. 6,163,155 (Bittar) is one such reference cited. Bittar reflects the skilled artisan's understanding of a tilted antenna. Bittar provides FIG. 6 and notes that the transmitter depicted therein is not tilted, but the receiver is tilted. Furthermore, FIG. 7 is provided to illustrate additional configurations, wherein either one or both of the transmitter and receiver(s) are tilted, while the other is not. The tilted transmitter and receivers in FIG. 6 are deviated from the longitudinal axis and also from the lateral axis or plane perpendicular to the longitudinal axis, which illustration corresponds to the definition of tilted antennas submitted by Applicants. Applicants also note that the Assignee (and inventor) of the patent, Dresser Industries, was one expected to be skilled in the oilfield services field, and in particular, well logging instruments.

Applicants also direct the Examiner's attention to U.S. Patent No. 6,147,496 (Strack), which patent was also cited. Strack discusses various configurations of coils including the three coils and magnetic dipole moments 26a, 28a in FIG. 6. According to the Specification, "[t]he coils with magnetic dipoles 26a and 28a are transverse coils, i.e., they are oriented so as to have magnetic dipole moments perpendicular to the wellbore axis..." (emphasis added). Applicants note as well that the Assignee of Strack, Shell Oil Company, is a major participant in the relevant oilfield services field.

Furthermore, U.S. Patent No. 5,781,436 (Forgang) is cited in the present specification as again reflective of the art of coil configurations. One does not need to explore the Forgang specification too far to find a definition of a transverse transmitter coil or transverse receiver coil. In the Background of the Invention, the Applicants provide "a transverse transmitter coil and a transverse receiver coil on the induction instrument, whereby the magnetic moments of these transverse coils is substantially perpendicular to the axis of the instrument." (See col. 1, line 65 to col. 2, line 3). Applicants note as well that the Assignee of the patent was, Western Atlas International, Inc., another major player in the oilfield services art. Applicants have reviewed the Forgang disclosure and did not find any mention of the transverse transmitter coil and transverse receiver coil depicted in FIGS. 3A and 3B, and described in the Specification, as being "tilted".

U.S. Patent No. 6,044,325 (Chakravarthy) is yet another of the patents cited in the specification as reflective of the prior art. Also assigned to Western Atlas International, Inc., Chakravarthy again defines a transverse transmitter coil and transverse receiver coil, as one wherein "magnetic moments are substantially perpendicular to the axis instrument" (Se col. 2,

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lns. 9-13). Again, nothing in this Specification makes reference to the transverse transmitter coil and transverse receiver coils as being "tilted."

Applicants also direct the Examiner's attention to cited reference U.S. Patent 6,304,086 (Minerbo). This reference has been cited as a §103(a) reference in the present examination, and also cited in Applicants' Background of the Invention. Minerbo is a reference that is reflective of the general knowledge of resistivity tools, and in particular, antennas having tilted or transverse coils. Applicants point out that the inventors of Minerbo assigned the invention to Schlumberger Technology Corporation (the Assignee of the present application). Applicants further note that the Assignee, Schlumberger Technology Corporation, is a leading oilfield services provider. Thus, the knowledge of those within Schlumberger, and who work with or are familiar with the subject matter of the present invention, is reflective of the general knowledge of those skilled in the relevant art.

Minerbo discusses coils having various configurations, including coils having tilted axes, as illustrated and described in respect to FIGS. 6 and 9. More detailed discussions are available in columns 17 and 18, beginning on lines 24-40 and 29-36, respectively. Applicants point out that the depicted coil configurations are referred to as having coils axes which are tilted relative to the tool's longitudinal axis ("tilted angle"). Now turning to FIG. 11, Minerbo discusses yet another coil configuration (see col. 18, beginning on line 64). Minerbo clearly describes that "[t]his configuration includes...having their axis transversely disposed, i.e., perpendicular to the tool's longitudinal axis." (emphasis added) The distinction is clearly made between coils with transverse axis and tilted coils.

Applicants submit, in summary, that in addition to the present application already distinguishing between tilted magnetic dipoles and transverse magnetic dipole, one skilled in the relevant art of well logging instruments and coil configurations understands the distinction between a tilted coil and a transverse coil. Applicants further submit that the inventors of the above U.S. Patents (many of whom have been issued other U.S. patents in the field) and their Assignees together are reflective of the field of well logging instruments, and of those particularly skilled in well logging instruments utilizing tilted or transverse magnetic dipoles. Applicants further submit that it is generally understood by these skilled artisans that a coil having a moment substantially perpendicular to the tool axis is referred to as a transverse coil,

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which is not a "tilted" coil. This understanding is evident from the cited references discussed above. Original claim 1 is, therefore, distinguishable and not anticipated by, or obvious in view of Fanini and the other cited references.

In addition, Fanini fails to disclose that the antennas are oriented such that the at least one tilted magnetic dipole corresponds to a first azimuthal angle, as claimed by the present invention. For this and the reasons stated above, independent claim 1 is not anticipated. Because claim 1 is not anticipated, dependent claims 2-18 are likewise not anticipated.

To facilitate examination of the presently pending claims, Applicant proposes to amend independent claim 1 to clarify that the subject magnetic dipole deviates, as well, from the lateral axis (or plane that is perpendicular to the axis). Specifically, amended claim 1 further recites that "the tilted magnetic dipole deviates from a plane substantially perpendicular to the longitudinal axis..." Support for the amended subject matter is, first, found in the definition of "tilted." Additional support may be found in the references cited in the Specification as reflective of the prior art coil configurations. Additional support may be found, as well, in FIGS. 4 and 5A which shows transmitter and receiver R with magnetic dipoles tilted in respect to the longitudinal axis "z" and the lateral axis "x". With either antenna T, R, the tilt is clearly deviated from a plane perpendicular to the longitudinal axis "z".

Applicant appreciates the Examiner's indication that claims 19-39 would be patentable if rewritten to include the indicated limitations. Applicant declines to make such amendments at this time because Applicant believes the base claims are in condition for allowance for the reasons stated above.

In view of the foregoing, all claims pending in the application are believed to be in condition for allowance. The Examiner is respectfully requested to pass the application to issue.

No fee is believed to be due at this time. If the appropriate Petition for an Extension of Time is not attached hereto (or any other Petition required of the application), this statement shall serve as Applicants' Petition to the U.S.P.T.O. The Commissioner is hereby authorized to charge any additional fees or credit any overpayments related to this Response to Deposit Account No. 190610 (19.0405), maintained by Schlumberger Technology Corporation.


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The undersigned is available for consultation at any time, if the Examiner believes such consultation may expedite the resolution of any issues.

Respectfully submitted,

Date:

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